

New Record of *Karoowia saxeti* (Stizenb.) Hale in South Korea

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Karoowia saxeti was recorded during the lichen field expedition in southern part of Korea in 2006. The lichen was found on the rock surface along coastal line. This species was easily recognized by chemistry (K+ yellow) and the presence of isidia. Thallus was saxicolous, subcrustose, more or less lobate at the center with clearly lobed margins, 2~6 cm broad and pale yellowish green. Thalli lobes were irregular, variable, up to 1.0mm wide, not branched, flat to more or less convex and contiguous to subimbricate. Upper surface of the thalli was continuous, emaculate, moderately isidiate. The isidia was subglobose to cylindrical, darkening at the tips and unbranched. Low surface of the thalli was black with a spongy rhizoidal and lamellar layer. HPLC analysis proved the presence of stictic acid (K+ yellow), norstictic acid and usnic acid. This is the first record of the species in South Korea.

KEYWORDS: Isidia, *Karoowia saxeti*, Korea, Lichen, Lichen-forming fungi, Stictic acid

The genus *Karoowia* is one of the unique lichenized Ascomycetes. The genus comprises ca. 20 species and belongs to the family Parmeliaceae (Index fungorum: <http://www.indexfungorum.org/Names>). This genus was separated from the genus *Xanthoparmelia* by Hale (1989). The specimens of *Karoowia* appear to be very similar to *Xanthoparmelia*, but they are almost subcrustose, small and very tightly adnate, often with a strongly areolate-cracked center and effigurate-lobate thallus margins. More significantly, they lack rhizines and either have a nearly bare lower surface or one covered with rhizoid-like attachment organs which have been misinterpreted as poorly developed rhizines (Hale, 1989). There has been no record on *Karrowia* lichen in Korean Peninsula so far (Hur *et al.*, 2005). During the domestic survey of lichen flora in South Korea, *Karoowia saxeti* was newly found, which is reported in this paper.

Materials and Methods

The description of the external morphology was based on the air-dried material observed under a dissecting microscope. The specimen used in this study was deposited in the lichen Herbarium of Korean Lichen Research Institute (KoLRI) in Suncheon National University, Korea. Specimens from Natural History Museum and Institute, Chiba (CBM), Japan were also examined for comparison purposes. Chemical analysis was made by HPLC method (Yoshimura, 1994) using YMC-Pack ODS-A column and

eluent solvent of MeOH:H₂O:H₃PO₄ (= 80 : 20 : 1, v/v/v).

Genus *Karoowia* Hale in Mycotaxon 35: 177 *Gaekbaw-imaehwajieu* Genus

Thallus tightly adnate, margin lobate, center subcrustose-areolate, lobes sublinear, 0.2~1.2 mm wide. Upper surface continuous, emaculate, often pruinose. Lower surface with rhizoid or forming lamellae. Conidia cylindrical. Apothecia immersed and aspicilioid or emergent. Spores ellipsoidal, simple.

Karoowia saxeti (Stizenb.) Hale in Mycotaxon 35: 190. *Gaekbawimaehwajieu* Fig. 1. A~C

External morphology: Thallus saxicolous, subcrustose, more or less lobate at the center with clearly lobed margins, 2~6 cm broad, pale yellowish green (Fig. 1A); lobes subirregular, variable 0.4~1.1 mm wide, sparingly branched, flat to more or less convex, contiguous to subimbricate (Fig. 1B); upper surface continuous, emaculate, shiny, moderately isidiate, the isidia subglobose to cylindrical, darkening at the tips, unbranched (Fig. 1C); lower surface black with a spongy rhizoidal and lamellar layer. Pycnidia common; conidia cylindrical, 0.5 × 6~8 μm. Apothecia initially aspicilioid but soon emergent and sessile, the disk brown, 0.5~0.8 mm in diameter; spores 5~6 × 9~11 μm.

Chemistry: Medulla K+ yellow; stictic acid, norstictic acid and Usnic acid (Fig. 2)

Habitat and ecology: Scattering on the rock surface of exposed splash zone along sea coastal lines with other lichens such as *Xanthoria* and *Caloplaca* sp. together (Fig. 1D).

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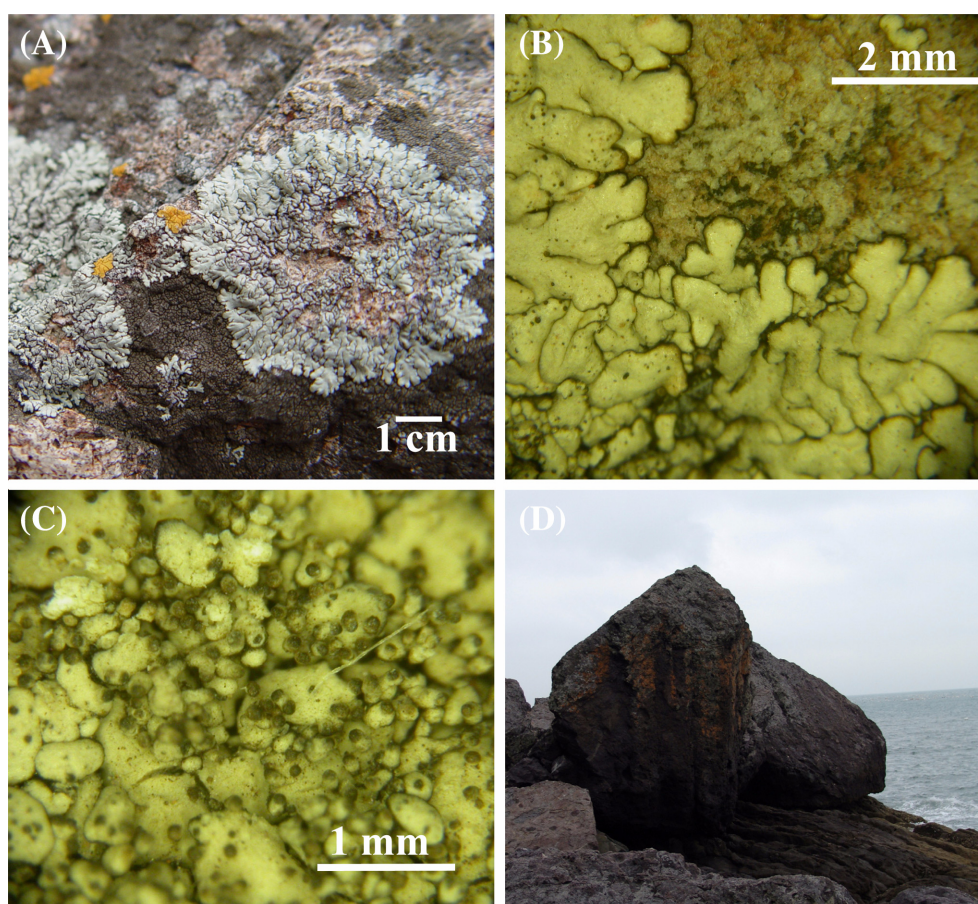


Fig. 1. *Karoowia saxeti*. A) Habitat, B) Upper surface and lobes, C) Isidia, D) Seaside rocks where the lichen (Hur 06-0001) grows with other lichens (*Caloplaca* and *Xanthoria* sp.).

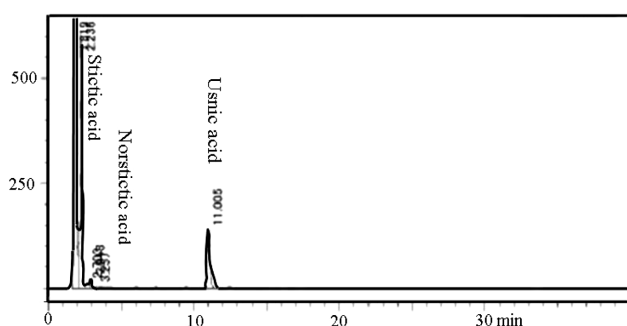


Fig. 2. HPLC of acetone extract of *Karoowia saxeti* (Hur 06-0001). Column YMC-Pack ODS-A, 150 × 4.6 mm I.D., S-5 μ m, 12 nm, solvent MeOH : H₂O : H₃PO₄ = 80 : 20 : 1 (v/v/v), column temp. 40°C, detection wave length 180–700 nm (254 nm).

Distribution: It is the most widespread species in the genus on the world level and occurs commonly on sandstones in South Africa, South West Africa, Brazil, Uruguay, Australia, Hong Kong, Taiwan, Japan and India. However, this is the first record of *Karoowia saxeti* in Korea. East Asian specimens (Taiwan, Japan and Korea) were mainly found along sea coast.

Specimen examined: **South Korea**, Jeonnam Prov., Yeosu., Dolsan island, 34°41'02.6"N, 127°46'50.8", 5m alt., on seaside rock (splash zone), Hur 06-0001; **Japan**, Wakayama-ken, Higashi-muro-gun, Koza-cho, Moritozaki point, 5m alt., on seaside rock (supertidal zone), Harada 16130. Ohshima island (Yashiro island) Yamaguchi-ken, Ohshima-gun, Touwa-cho, Yun, Hokibaba point, 6m alt., on basaltic rocks (splash zone), Harada 16295.

Remarks: This species is easily recognized by chemistry (stictic acid) and the presence of isidia. Only two species of *K. microscopica* and *K. saxeti* are isidate, but the former has no stictic acid (K–).

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